

# Voltage monitoring relays CM-ESS.1 for single-phase AC/DC voltages

For the monitoring of voltages in single-phase AC/DC systems, ABB's CM range comprises a wide selection of powerful and compact devices, all featuring only 22.5 mm (0.89 in) width.

This range includes voltage monitoring relays for over- and undervoltage protection from 3 V to 600 V.

Incorporating ABB's long-term experience, the CM range provides your electric installation with the highest safety and reliability.



## Characteristics

- Monitoring of DC and AC voltages from 3-600 V
- TRMS measuring principle
- One device includes 4 measuring ranges
- Over- or undervoltage monitoring configurable
- Hysteresis adjustable from 3-30 %
- 3 supply voltage versions
- 1 c/o contact
- 22.5 mm (0.89 in) width
- 3 LEDs for indication of operational states

## Order data







### Voltage monitoring relays

Type	Rated control supply voltage	Measuring ranges	Order code
CM-ESS.1	24-240 V AC/DC	3-30 V, 6-60 V, 30-300 V, 60-600 V	1SVR 430 830 R0300
	110-130 V AC		1SVR 430 831 R0300
	220-240 V AC		1SVR 430 831 R1300

### Accessories

Type	Description	Order code
ADP.01	Adapter for screw mounting	1SVR 430 029 R0100
MAR.02	Marker label for devices with DIP switches	1SVR 430 043 R0000
COV.01	Sealable transparent cover	1SVR 430 005 R0100

## Approvals

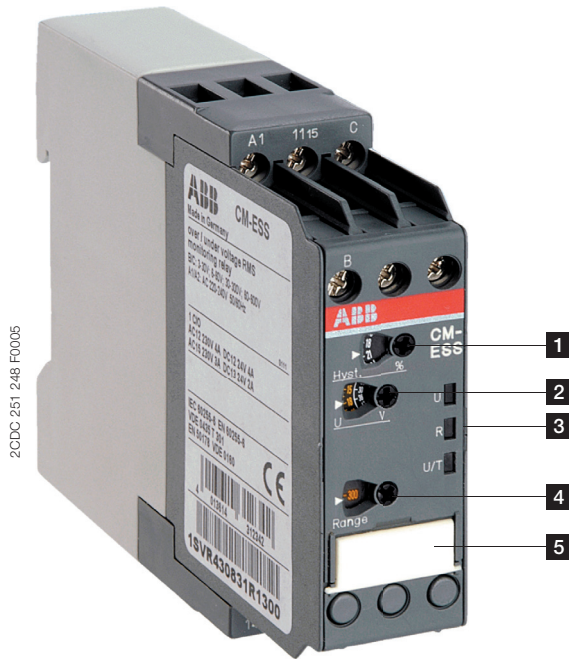
	UL 508, CAN/CSA C22.2 No.14	
	GL	(pending)
	GOST	
	CB Scheme	
	CCC	
	RMRS	

## Marks

	CE
	C-Tick



## Functions

### Operating controls





- 1** Adjustment of the hysteresis
- 2** Adjustment of the threshold value
- 3** Indication of operational states  
U/T: green LED – control supply voltage  
R: yellow LED – relay status  
U: red LED – over- / undervoltage
- 4** Adjustment of the measuring range
- 5** DIP switches (see DIP switch functions)

### Application

Depending on the configuration, the voltage monitoring relays CM-ESS.1 can be used for over-  or undervoltage monitoring  in single-phase AC and/or DC systems. The devices work according to the open-circuit principle.

### Operating mode

The voltage monitoring relay CM-ESS.1 has 1 c/o contact. One device includes 4 measuring ranges: 3-30 V, 6-60 V, 30-300 V, and 60-600 V.

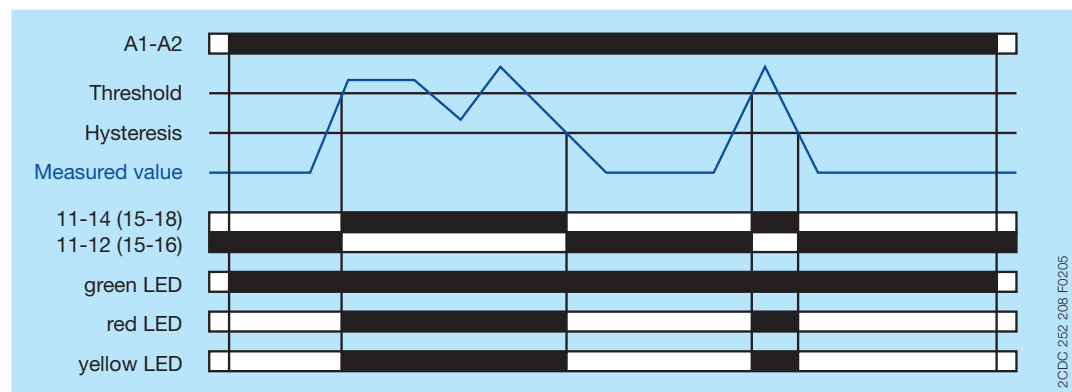
The unit is adjusted with potentiometers and switches on the top of the unit. The selection of over-  or undervoltage monitoring  is made with a DIP switch. Potentiometers, with direct reading scale, allow the adjustment of the threshold value U and of the hysteresis %. The hysteresis % is adjustable within a range of 3 to 30 % of the threshold value.

### Function diagram: overvoltage monitoring

The voltage to be monitored (measured value) is applied to terminals B-C. The supply voltage applied to terminals A1-A2 is displayed by the glowing green LED.


If the measured value exceeds the adjusted threshold value, the output relay energizes and the red LED (overvoltage) and the yellow LED (relay energized) glow.

If the measured value drops below the threshold value minus the adjusted hysteresis, the output relay de-energizes and the red and yellow LEDs turn off.

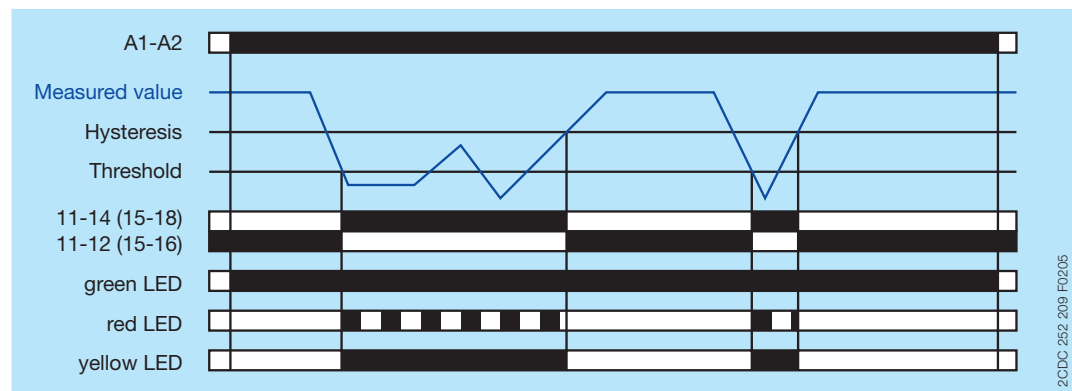


### Function diagram: undervoltage monitoring

The voltage to be monitored (measured value) is applied to terminals B-C. The supply voltage applied to terminals A1-A2 is displayed by the glowing green LED.

If the measured value drops below the adjusted threshold value, the output relay energizes, the red LED flashes  (undervoltage) and the yellow LED (relay energized) glows.

If the measured value exceeds the threshold value plus the adjusted hysteresis, the output relay de-energizes and the red and yellow LEDs turn off.



Connection diagram

A1	11 <sub>15</sub>	C
B		

14 <sub>18</sub>	12 <sub>16</sub>	A2
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2CDC 252 206 F0005

A1-A2      Control supply voltage

B-C      Measuring range: 3-30 V, 6-60 V, 30-300 V, 60-600 V

11<sub>15</sub>-12<sub>16</sub>/14<sub>18</sub>      Output contact - open-circuit principle

DIP switch functions

Position	2	1
ON ↑		
OFF		

2CDC 252 275 F0005

1    ON    Undervoltage monitoring

     OFF    Overvoltage monitoring

     OFF = Default





## Technical data

Data at  $T_a = 25\text{ °C}$  and rated values, unless otherwise indicated



### Input circuit

Supply circuit		A1-A2		
Rated control supply voltage $U_s$		110-130 V AC	220-240 V AC	24-240 V AC/DC
Rated control supply voltage tolerance		-15...+10 %		
Rated frequency		50/60 Hz		50/60 Hz or DC
Current / power consumption	24 V DC	-	-	30 mA / 0.75 W
	115 V AC	24 mA / 2.6 VA	-	17 mA / 1.9 VA
	230 V AC	-	12 mA / 2.6 VA	11 mA / 2.6 VA
On-period		100 %		
Power failure buffering time		20 ms		
Transient overvoltage protection		varistors		
Measuring circuit		B-C		
Monitoring function		over- or undervoltage monitoring configurable		
Measuring method		TRMS measuring principle		
Measuring inputs	terminal connection	B-C		
	measuring range	3-30 V, 6-60 V, 30-300 V, 60-600 V		
	input resistance	600 k $\Omega$		
	pulse overload capacity $t < 1\text{ s}$	800 V		
	continuous capacity	660 V		
Threshold value		adjustable within the indicated measuring range		
Tolerance of the adjusted threshold value		10 % of the range end value		
Hysteresis related to the threshold value		3-30 % adjustable		
Measuring signal frequency range		DC / 15 Hz - 2 kHz		
Rated measuring signal frequency range		DC / 50-60 Hz		
Maximum response time	AC	80 ms		
	DC	120 ms		
Accuracy within the control supply voltage tolerance		$\Delta U \leq 0.5\text{ %}$		
Accuracy within the temperature range		$\Delta U \leq 0.06\text{ % / °C}$		
Transient overvoltage protection		varistors		
Timing circuit				
Delay time $T_V$		none		
Repeat accuracy (constant parameters)		$\pm 0.07\text{ % of full scale}$		
Tolerance of the adjusted delay time		-		
Accuracy within control supply voltage tolerance		-		
Accuracy within temperature range		-		

### Indication of operational states

Control supply voltage	U/T: green LED	 : control supply voltage applied
Measured value	U: red LED	 : overvoltage
		 : undervoltage
Relay status	R: yellow LED	 : relay energized

## Output circuits

Kind of output	11-12/14	relay, 1 c/o contact
Operating principle		open-circuit principle (output relay energizes if the measured value exceeds  / falls below  the adjusted threshold value)
Contact material		AgNi
Rated operational voltage $U_e$ (VDE 0110, IEC/EN 60947-1)		250 V
Minimum switching voltage / minimum switching current		24 V / 10 mA
Maximum switching voltage / maximum switching current		250 V AC / 4 A AC
Rated operational current $I_e$ (IEC/EN 60947-5-1)	AC12 (resistive) at 230 V	4 A
	AC15 (inductive) at 230 V	3 A
	DC12 (resistive) at 24 V	4 A
	DC13 (inductive) at 24 V	2 A
AC rating (UL 508)	utilization category (Control Circuit Rating Code)	B 300
	max. rated operational voltage	300 V AC
	max. continuous thermal current at B 300	5 A
	max. making/breaking apparent power (Make/Break) at B 300	3600/360 VA
Mechanical lifetime		30 x 10 <sup>6</sup> switching cycles
Electrical lifetime (AC12, 230 V, 4 A)		0.1 x 10 <sup>6</sup> switching cycles
Maximum fuse rating to achieve short-circuit protection	n/c contact	6 A fast-acting
	n/o contact	10 A fast-acting

## General data

MTBF		available on request
Dimensions (W x H x D)	product dimensions	22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 in)
	packaging dimensions	81 x 106 x 26 mm (3.19 x 4.17 x 1.02 in)
Weight	net weight	version 24-240 V AC/DC: 0.125 kg (0.276 lb)
		version 110-130 V AC: 0.153 kg (0.337 lb)
		version 220-240 V AC: 0.154 kg (0.339 lb)
	gross weight	version 24-240 V AC/DC: 0.148 kg (0.326 lb)
		version 110-130 V AC: 0.175 kg (0.386 lb)
		version 220-240 V AC: 0.176 kg (0.388 lb)
Material of enclosure		PA 6
Mounting		DIN rail (IEC/EN 60715)
Mounting position		any
Degree of protection	enclosure	IP50
	terminals	IP20

## Electrical connection

Wire size	fine-strand with(out) wire end ferrule	2 x 0.75-2.5 mm <sup>2</sup> (2 x 18-14 AWG)
	rigid	2 x 0.5-4 mm <sup>2</sup> (2 x 20-12 AWG)
Stripping length		7 mm (0.28 in)
Tightening torque		0.6-0.8 Nm (5.31-7.08 lb.in)

## Environmental data

Ambient temperature	operation	-20...+60 °C
	storage	-40...+85 °C
Damp heat (IEC 60068-2-30)		55 °C, 6 cycle
Vibration (sinusoidal) (IEC/EN 60255-21-1)		class 2
Shock (IEC/EN 60255-21-2)		class 2

## Isolation data

Rated insulation voltage (VDE 0110, IEC/EN 60947-1, IEC/EN 60255-5)	supply / measuring circuit / output	600 V
	supply / output 1 / output 2	250 V
Rated impulse withstand voltage $U_{imp}$ (IEC/EN 60947-1, IEC/EN 60255-5)	supply / measuring circuit / output	6 kV 1.2/50 $\mu$ s
	supply / output 1 / output 2	4 kV 1.2/50 $\mu$ s
Test voltage between all isolated circuits (type test)	rated insulation voltage 250 V	2.0 kV, 50 Hz
	rated insulation voltage 600 V	2.5 kV, 50 Hz
Pollution degree (VDE 0110, IEC 664, IEC/EN 60255-5)		3
Overvoltage category (VDE 0110, IEC 664, IEC/EN 60255-5)		III

## Standards

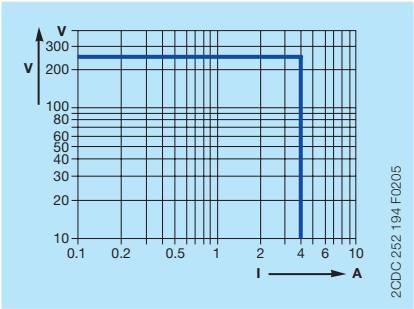
Product standard	IEC/EN 60255-6
Low Voltage Directive	2006/95/EC
EMC Directive	2004/108/EC
RoHS Directive	2002/95/EC

## Electromagnetic compatibility

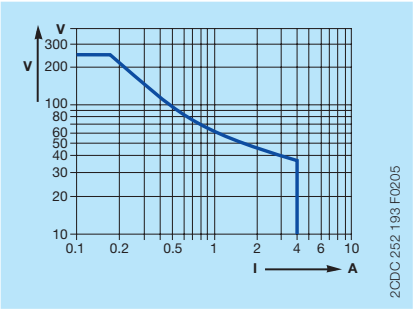
Interference immunity to		IEC/EN 61000-6-2
electrostatic discharge	IEC/EN 61000-4-2	Level 3
radiated, radio-frequency, electromagnetic field	IEC/EN 61000-4-3	Level 3
electrical fast transient / burst	IEC/EN 61000-4-4	Level 3
surge	IEC/EN 61000-4-5	Level 3
conducted disturbances, induced by radio-frequency fields	IEC/EN 61000-4-6	Level 3
Interference emission		IEC/EN 61000-6-3
high-frequency radiated	IEC/CISPR 22, EN 55022	Class B
high-frequency conducted	IEC/CISPR 22, EN 55022	Class B

Technical diagrams

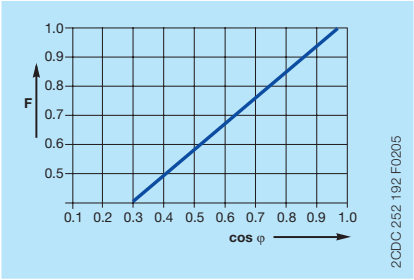
Load limit curves



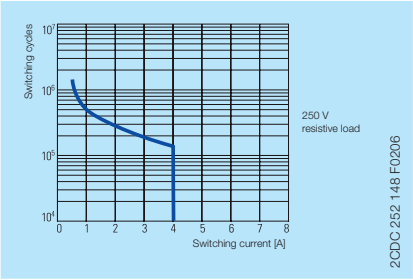
AC load (resistive)



DC load (resistive)



Derating factor F for inductive AC load

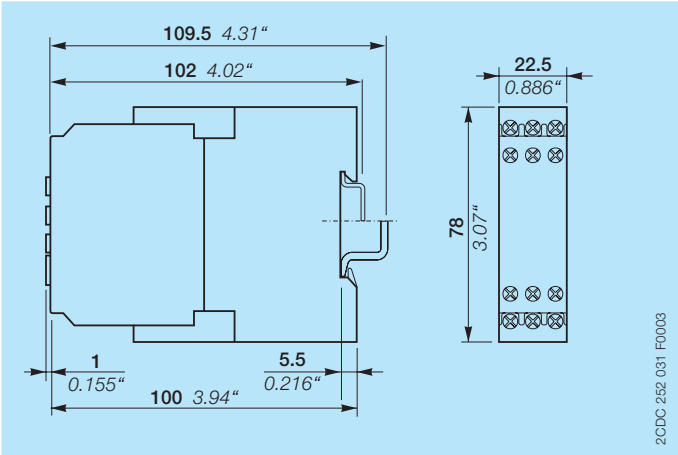


Contact lifetime

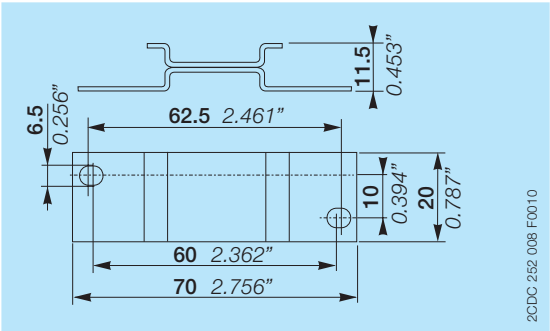


Dimensions

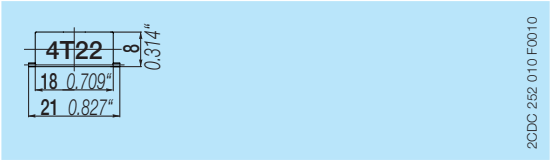
in mm and inches



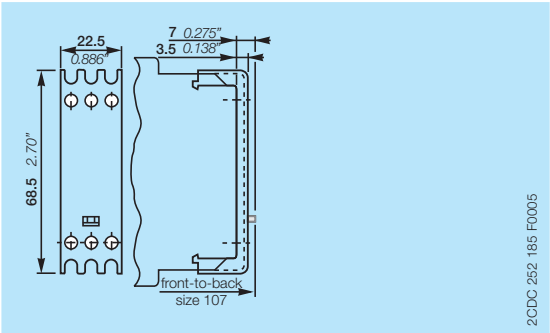
CM-ESS.1



ADP.01 - Adapter for screw mounting



MAR.02 - Marker label for devices with DIP switches



COV.01 - Sealable transparent cover

Further documentation

Document title	Document type	Document number
Electronic products and relays	Technical catalogue	2CDC 110 004 C020x
CM-ESS.1, CM-ESS.2	Instruction manual	1SVC 437 833 M1000

You can find the documentation on the internet at [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage) -> Control Products -> Electronic Relays and Controls -> Single Phase Monitors

# Contact us

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-> Low Voltage Products and Systems

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